

State of Wisconsin/Department of Transportation
RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Dec 31, 2002

Program: SPR-0010(36) FFY99		Part: II Research and Development	
Project Title: Effects of Ground Granulated Blast Furnace Slag in Portland Cement Concrete		Project ID: 0092-02-14a	
Administrative Contact: Nina McLawhorn		Sponsor:	
WisDOT Technical Contact: Error! Bookmark not defined.		Approved Starting Date: Nov 7, 2001	
Approved by COR/Steering Committee: \$194,251.00		Approved Ending Date: Dec 31, 2003	
Project Investigator (agency & contact): Steve Cramer: UW-Madison			

Description: Federal transportation directives encourage the use of by-product materials and mandate open and unrestricted competition for alternative cementitious materials. In 1995, the EPA listed ground granulated blast furnace slag (GGBFS) as a recyclable material in the Federal Register. GGBFS is a cementitious materials that replaces a portion of the portland cement in a concrete mix and is being used with increasing frequency for pavement in concrete in Wisconsin.

The production and use of GGBFS is more than 100 years old, yet significant levels of use in Wisconsin are quite recent. GGBFS is manufactured across the world but recently has been offered in Wisconsin by only one manufacturer.

Relevant questions associated with GGBFS use for Wisconsin include: 1) what replacement level of cement is most appropriate and what are the performance tradeoffs with different levels?

2) How do the fineness and activation characteristics vary from shipment to shipment of GGBFS among shipments of the current primary supplier and those of other new suppliers planning product introduction in 2001?

3) How does the GGBFS effect performance, change with different cement chemical compositions?

4) Are there undesirable interactions with admixtures or other additives?

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
\$194,251.00	\$64,750.33	\$0.00	\$17,079.41	33 (%)

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Progress This Quarter:

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

Progress this quarter has included the preparation of concrete mixtures and evaluation of the corresponding concrete specimens. As of the end of 2002, four mixtures were prepared with cement replacements of 0%, 30% and 50% GGBFS. All of these mixtures were prepared with one type of cement, one type of GGBFS and one set of aggregates (limestone aggregates from southern Wisconsin). Scaling specimens were prepared from these mixtures with no wet curing, wet curing and air curing with two different curing compounds. Deicer salt scaling tests commenced during this quarter for these specimens. Using a modified ASTM procedure, the amount of scaled material is captured for each specimen and the accumulated weight is measured. As expected, specimens with 50% cement replacement with GGBFS are displaying noticeably more scaling. Compressive strength and shrinkage test data also have been gathered.

We are also sampling monthly shipments of GGBFS for consistency that are coming into the Madison area. Samples have been collected and analysis of these samples has commenced.

During this quarter we collected a second coarse aggregate for the project that is representative of northern Wisconsin igneous aggregates. These aggregates are collected and stored in sufficient quantity to enable all the necessary concrete mixing in the project. These aggregates will provide the supply for additional concrete mixing and evaluations for the next quarter.

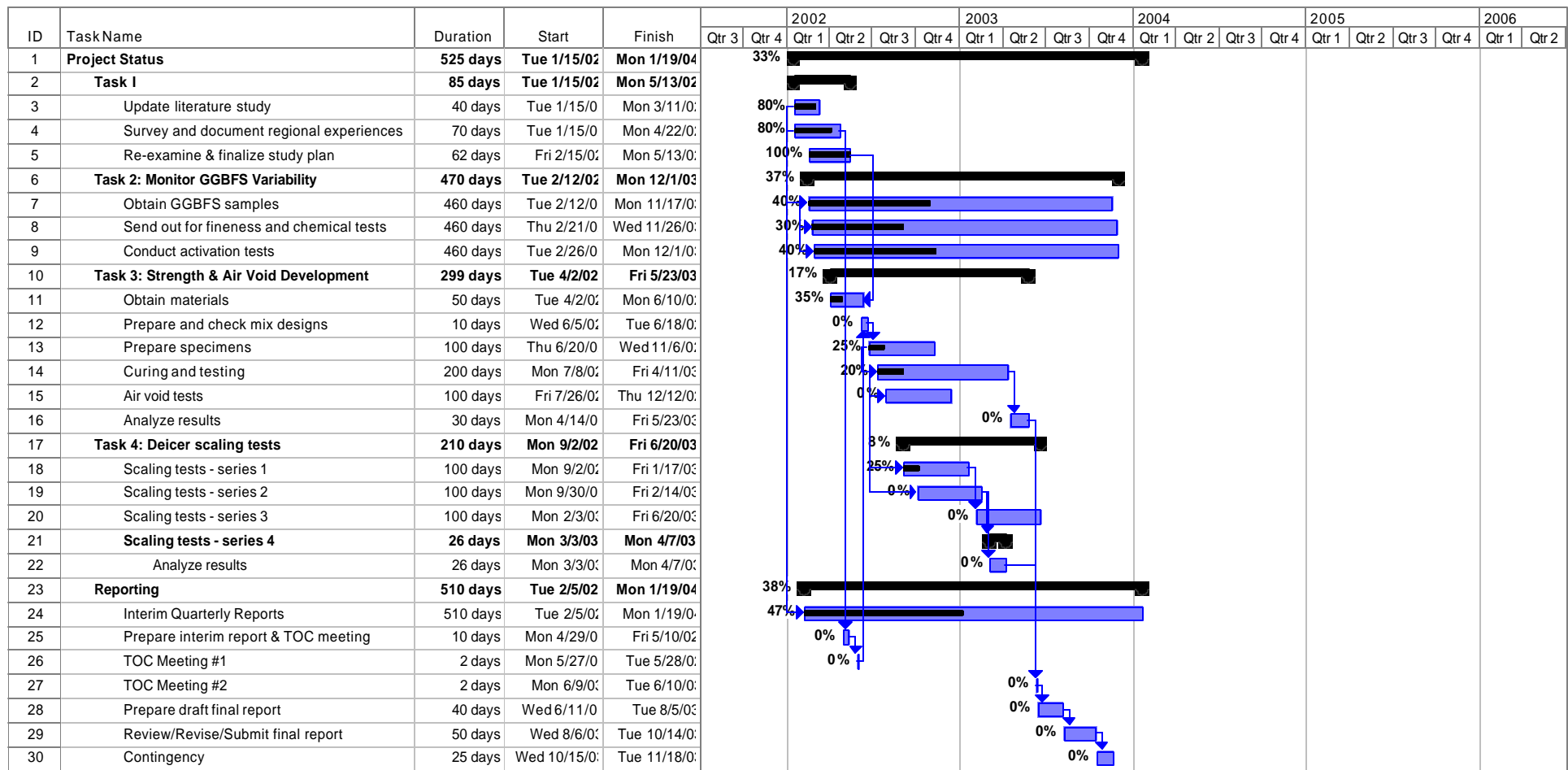
Work Next Quarter:

Select and obtain a 2nd source of cement. Prepare and evaluate concrete mixes per the work plan. Continue deicer scaling tests with current and newly prepared concrete specimens.

Circumstances affecting progress/budget:

We are running behind schedule since only one graduate student is currently on the project, but progress is being made. A second graduate student is being sought for the project.

Gantt Chart:



Note: Gantt chart shown in State Fiscal Year Quarters